

Environmental GIS Workbench, v2.0

Users Guide

(System ID: EG)

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The Environmental GIS Workbench (Version 2.0) is a desktop extension that provides easy access to existing environmental data and environmental data processing tools within ESRI's ArcView GIS. The extension is used in the development and completion of the Environmental Review section of the Project Summary, a report required for a majority of WSDOT construction projects. This application provides a convenient method for accessing corporate GIS data by subject and location in order to analyze the data, and a means of capturing the results for documentation.

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This document is preliminary, has not undergone formal review or editing and is provided for informational purposes only.

Environmental GIS Workbench Users Guide

Introduction:

The Environmental GIS Workbench (Version 2.0) is a desktop extension that provides easy access to existing environmental data and environmental data processing tools within ArcView GIS. The extension is used in the development of the Environmental Review Summary of the Project Summary. This application provides a convenient method for accessing data by subject and location in order to analyze the data, and a means of capturing the results for documentation. The intention is to reduce the amount of training and the learning curve that is presently needed by new GIS users to access the existing data, thereby improving the efficiency and the quality of the review process. In addition to accessing environmental data, the user has the capability to add other layers from the GIS servers, including SR View images and digital orthophotography. Users now have the capabilities to build custom maps real time, perform spatial analysis, and create hardcopy prints of their work.

Installation:

The Environmental GIS Workbench is an **Extension** that can be loaded into any ArcView GIS project. *Extensions are add-on programs that provide users with specialized GIS functionality. When you load an extension, ArcView's user interface changes to reflect the functionality available in the extension.* The extension will be deployed by IT with SMS. The SMS deployment will be used to deploy the new extension to current users. New users must contact your IT support person to have this extension installed.

Network Information:

The workbench will retrieve data from three servers. These servers will vary depending on the users location.

1. GIS Server

The application will retrieve data layers via the WSDOT Corporate server. The GIS server should be linked to the W drive (This has been standardized in the department).

2. DOT Applications Server

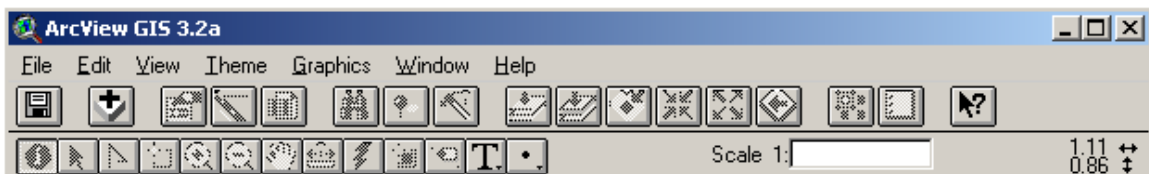
The application will use a DLL from this server to convert Milepost values to ARM values. This should be mapped as the W drive (also standardized in the department).

3. SR View Server

The application will retrieve SR View Images from this server. The location of these images varies depending on the region.

What software is necessary?

ArcView 3.2 or 3.2a needs to be installed on the users machine. ArcView is a desktop GIS software package from a company called Environmental Systems Research Institute (ESRI), Inc. This software from ESRI has been selected as the level-playing-field GIS for WSDOT. ArcView is actually a set of tools for capturing, storing, analyzing, and displaying spatial data. ArcView is an easy-to-use GIS that has a “point-and-click graphical user interface similar to that of other common PC-based products. The user simply interacts with a series of custom designed “menus”, “buttons”, or “tools” as illustrated in the figure below:

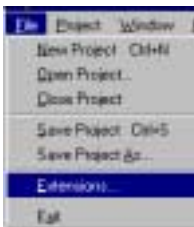


By working these icons, it is easy for the user to load geographic data (maps) as well as tabular data, query the maps or tables, and display results on custom made maps.

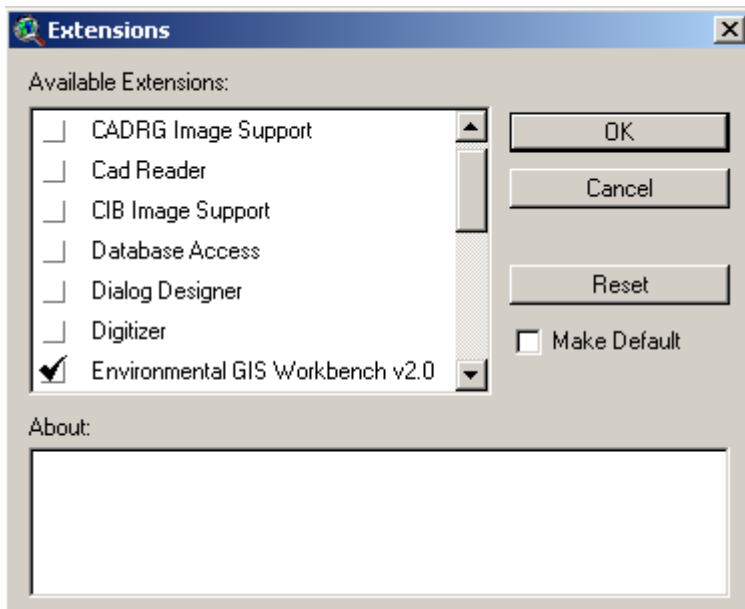
Getting Started:

Step 1: Add Environmental GIS Workbench to your ArcView Project:

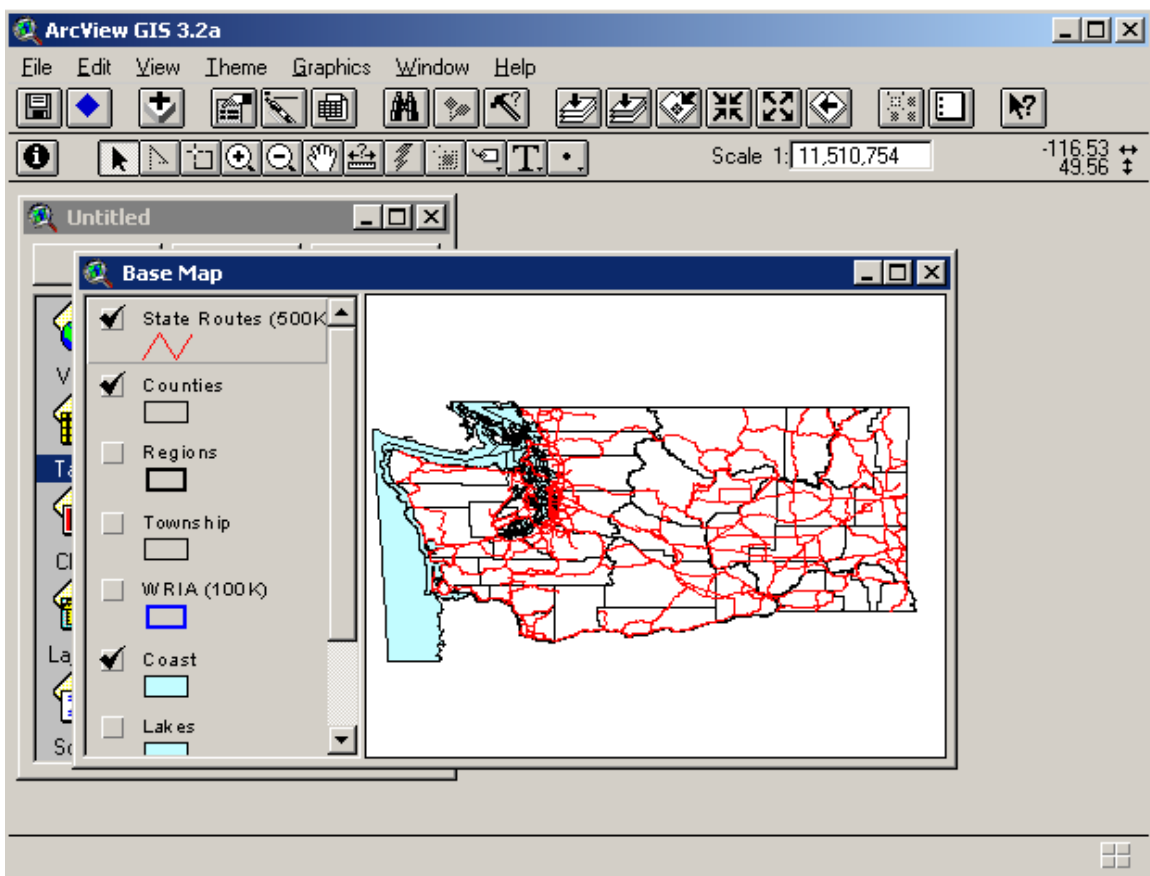
Open ArcView and Select the **Extensions** option from the File menu.



Load the Environmental GIS Workbench Extension by checking the box and select OK.



A Base Map will appear in a View and a Blue Button will be added to the project.

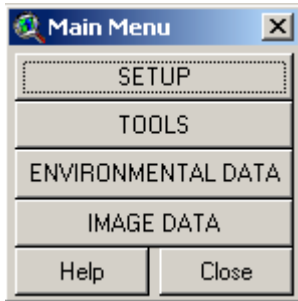


Step 2: Access the Workbench Dialog

Select the Blue Button any time you wish to use the Workbench utilities. This will open the workbench main menu:



← Click to open the Main Menu



Workbench Components

The following sections will describe the four components of the Workbench Dialog:

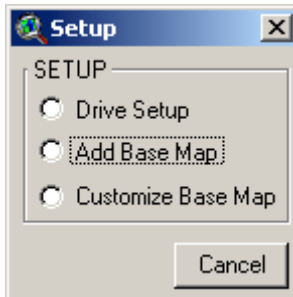
Setup

Tools

Environmental Data

Image Data

1. SETUP:



Drive Setup:

This allows you to select which drive your Corporate data is linked to. The application is designed to access maps from the W drive by default, however not everyone has the drive correctly designated. Select Drive Setup and choose a drive letter to designate your Corporate Server.

Add Base Map:

Add themes to create a base map in a view. You will have a choice of adding base maps to an existing view or a new view. The following themes will be added to the view when you choose this option:

State Routes (500K LRS)

Counties

Regions (500K)

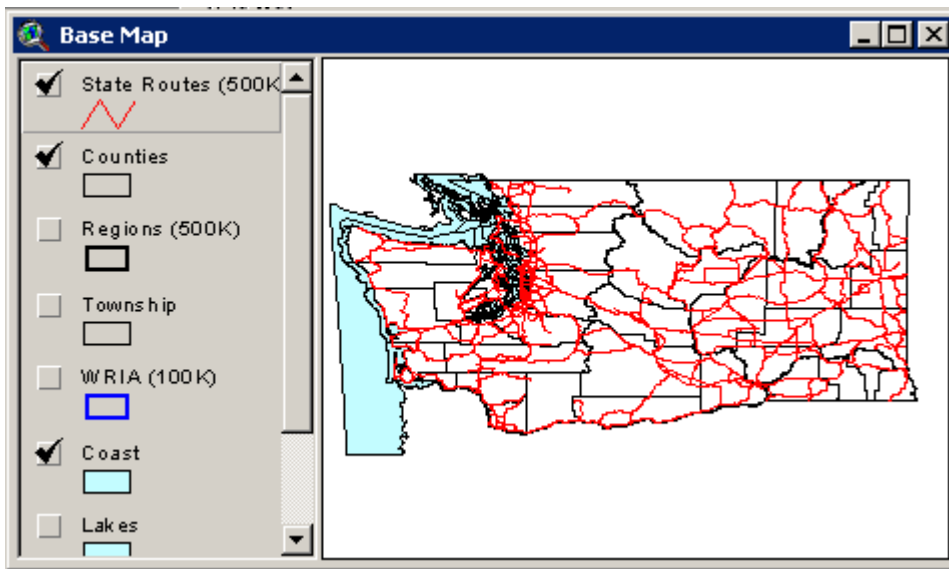
Township

WRIA (100K)

Coast

Lakes



Cities



Note: As you **load** the extension, a set of base maps will be added to a view in your project. If there is a view named Base Map in your project, you will be given an option to add these. Otherwise, a base map is always added when the extension is loaded.

Customize Base Map:

Add additional transportation, boundary, and “other” non-environmental data to the base map (or currently selected view). This dialog provides the user with the ability to add commonly needed GIS layers to their view. Note that layers shown “(1:500K or 1:24K)” or similar have scale dependency turned on. This means that the most appropriate representation of the given layer (e.g., roads) will be shown as one zooms-in or -out within your view.

 **Customize Base Map** 

Transportation

- ☐ State Routes (1:500K or 1:24K)
- ☐ Active Railroads (1:500K or 1:24K)
- ☐ Ferry Routes (24K)
- ☐ Bridges, Tunnels, and Under/Overcrossings
- ☐ Local Roads by County (1:100K)
- ☐ High Accident Locations (Vehicle)
- ☐ Capital Improvement and Preservation Program, 2001-2003
- ☐ Capital Improvement and Preservation Program, 6 year plan

Boundaries

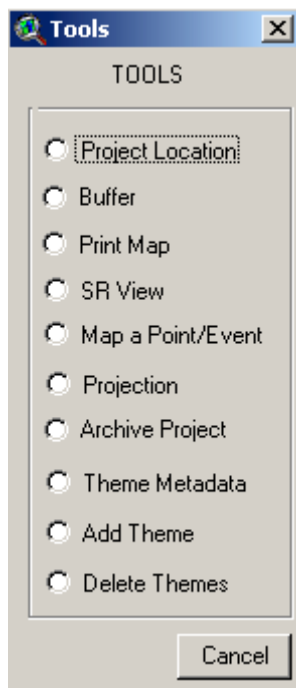
- ☐ Department of Transportation Regions (1:500K or 1:24K)
- ☐ Water Resource Inventory Area (1:100K or 1:24K)
- ☐ Cities (point location or polygon at 1:24K)
- ☐ Urban Growth Areas of Puget Sound
- ☐ USGS Hydrologic Units (HUC)
- ☐ U.S. Congressional Districts
- ☐ Legislative Districts

Other

- ☐ WSDOT Survey Monuments (Primary Control)
- ☐ NGS Survey Monuments (HARN Stations)

(Indicates Scale Dependent Theme Set)

2. TOOLS:



Project Location

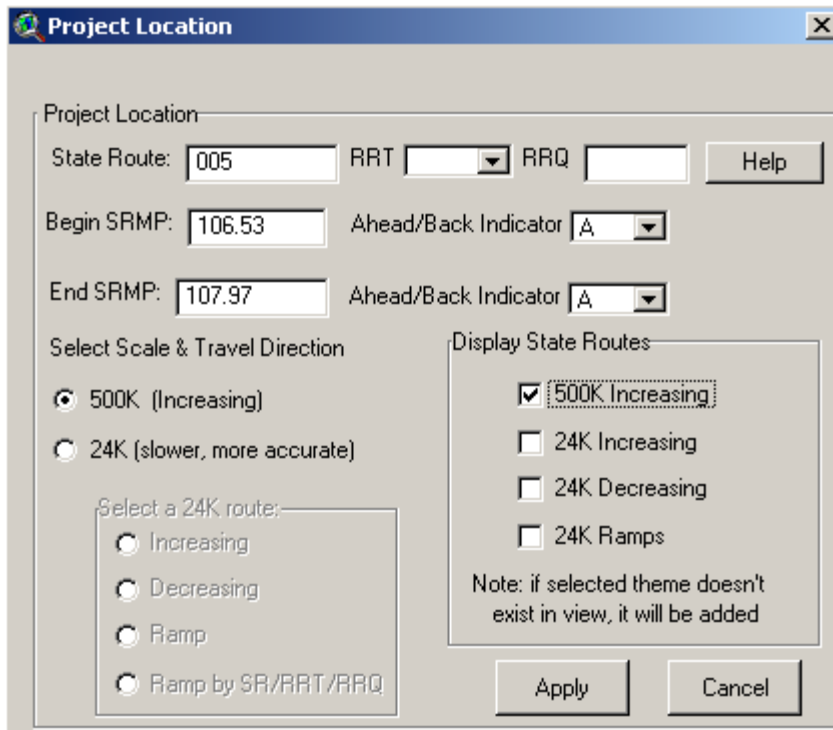
This tool allows you to locate your project on the State Route system. The user is prompted with a message box asking for the State Route, RRT, RRQ, Beginning Milepost and Ending Milepost and Ahead/Back indicators as well as the direction of travel (default is increasing). A graphic representing the project limits will draw on the appropriate State Route. For help on the location reference system (LRS), click on the help button on the “Project Location” dialog.

What follows are some examples of valid project location descriptions that may help you in formatting your request.

State Route	Direction Qualifier	Related Roadway Type	Related Roadway Qualifier	Beginning Milepost & Indicator	Ending Milepost & Indicator	Project Is On
005	I			117.50 A	118.75 A	Mainline
018	I	P1	00614	0.17 A	0.25 A	Ramp
105	I	SP	WESTPT	31.0 A	31.10 A	Spur
028	D			2.50 B	2.75 B	Mainline

Once the entered SR/RRT/RRQ and milepost are found, the currently active view will be redrawn and zoomed into the project location. If you enter an invalid State Route or Milepost, an error message will be generated by the ArmCalc.dll. This message will assist

you in determining what portion of the user input was entered incorrectly. If you have repeated errors while attempting to map a project on a ramp, try using the “Ramp by SR/RRT/RRQ” only option.



The "Project Location" dialog box is used for specifying the location of a project. It includes fields for State Route (005), RRT (dropdown), RRQ (dropdown), Begin SRMP (106.53), and End SRMP (107.97). It also has "Ahead/Back Indicator" dropdowns. The "Select Scale & Travel Direction" section has radio buttons for "500K (Increasing)", "24K (slower, more accurate)", and a sub-section for "Select a 24K route:" with options "Increasing", "Decreasing", "Ramp", and "Ramp by SR/RRT/RRQ". The "Display State Routes" section has checkboxes for "500K Increasing" (checked), "24K Increasing", "24K Decreasing", and "24K Ramps". A note states: "Note: if selected theme doesn't exist in view, it will be added". Buttons for "Help", "Apply", and "Cancel" are present.

Note: This tool uses a DLL, which converts the State Route Milepost to an Arm value. This ensures accurate placement of the project along the route. The project won't place properly on the state route if the DLL is unavailable.

Buffer

This tool allows you to place a buffer around a graphic or a feature. A series of dialog boxes will take you through the buffer steps.



The "Create Buffers" dialog box is used for creating buffers around features. It includes an "About buffers" section with a diagram showing a feature with a buffer ring. The "What do you want to buffer?" section has radio buttons for "The graphics in your view" and "The features of a theme" (selected). The "The features of a theme" section has a dropdown menu showing "State Routes LRS". Below this, it shows "Number of features: 253" and "Number of features selected: 0". There is a checkbox for "Use only the selected features". Buttons for "Help...", "Cancel", "<< Back", and "Next >>" are at the bottom.

Your view must be projected for the buffers to be accurate.
Select the Help button on the Buffer Dialog for more information.

Print Map

Creates a map (layout) that can be printed. A series of dialog boxes will ask questions about creating the map. The end result will be a Layout that is ready to be printed. The size options are 8.5 x 11 or 11 x 17.

Note: You can make additional changes to the Layout. This tool is meant to create a basic map. Feel free to make changes to the layout before you print.

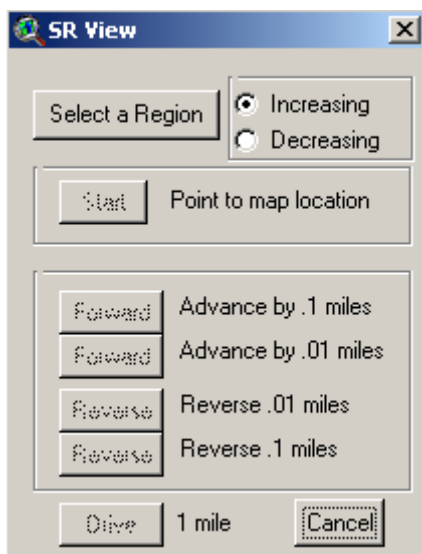
SR View

Imports SR View images for a location on the State route. The user points to a position on the state route and the appropriate SR View image will appear. To assist in finding the desired location, the user may drive down the road at one mile steps in both the increasing and decreasing direction.

Step 1: Select a Region

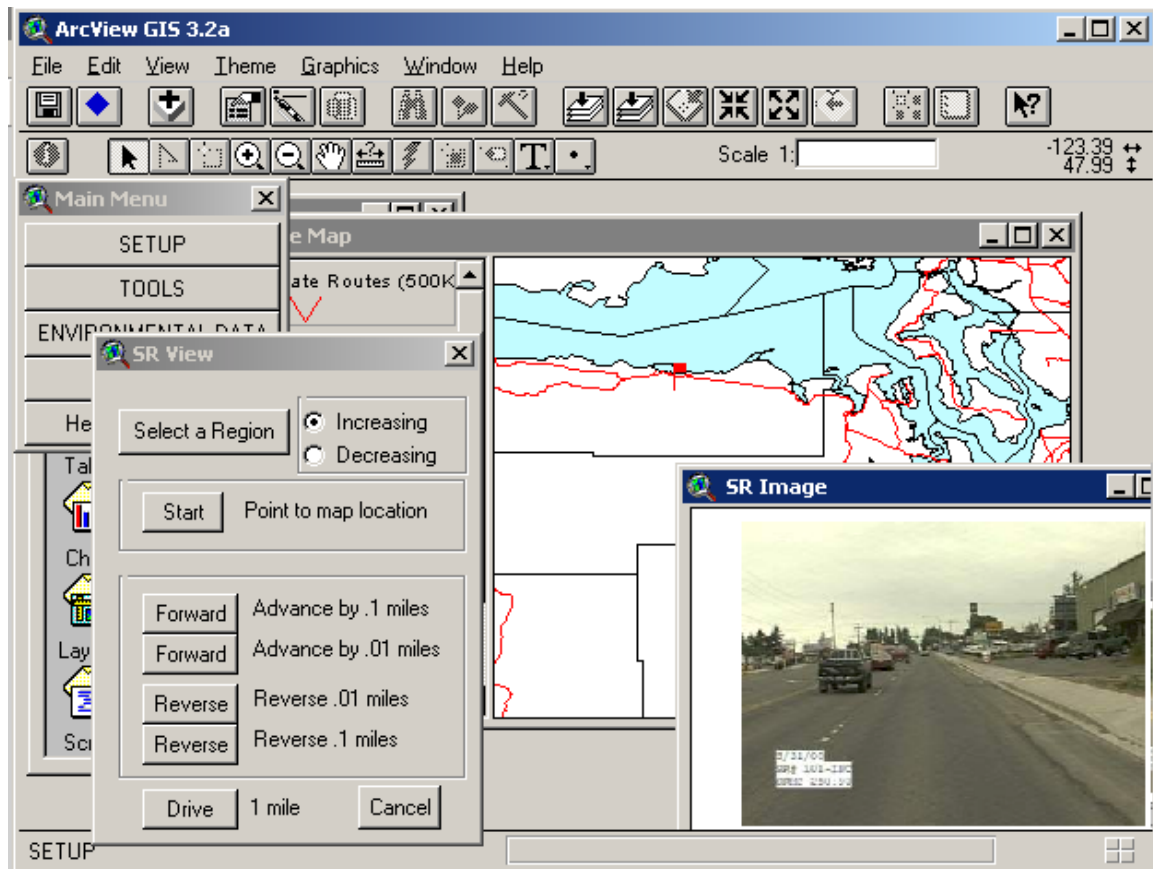
Press the **Select a Region** Button to choose your region. A message box will display a list of Regions. Select your region and you will be connected to your regional server. Select OSC if you are working in OSC or need an image outside your region. Again you will be prompted for the region you are interested in.

Note: Region servers only contain SR View images for their region. The OSC choice will link to a server that contains all of the images in the state. The disadvantage of using the OSC server from a Region is that the images may be retrieved very slowly.



Step 2: Start

Press the start button to select a location on the map. Wait a few seconds for the image to be retrieved. Use the forward and reverse buttons to move up and down the state route.

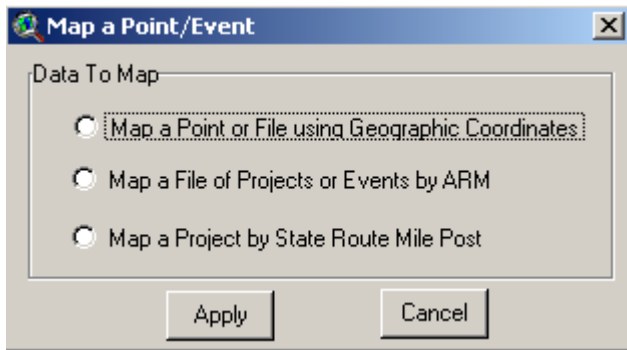


Note: Resize the SR View image window so you can see your original view. This allows you to see your location on the map (marked by a red flag) and see the SR View Image simultaneously.

If you need to go to a different region, choose the **Select a Region** button and select the new region.

Map a Point/Event:

Allows a user to map point or event data based on several different data formats or data sources. “Map a Point” is used to map a single point, or file of points, using geographic coordinates. “Map a File of Projects” is used to map a file of events (linear or point) by SR/RRT/RRQ and Accumulated Route Mile (ARM) using WSDOT’s 1:24K Location Reference System (LRS) for State Routes. “Map a Project” is used to map a single project given a State Route and milepost by opening the “Project Location” dialog.

**Projection:**

Changes the projection of the view. A message box will appear prompting the user to select a projection. Once a projection is selected, the entire view will be projected. Only the view is projected, not the source data. Currently the following projections are supported: Geographic (distance units: none), Lambert (feet), Washington State Plane South Zone (feet), Washington State Plane North Zone (feet), UTM Zone 10 (meters), and UTM Zone 11 (meters). All projections are based on the North American Datum of 1983.

Archive Project:

Copies the contents (i.e., including views) within the current project to disk. This will copy the data from the Corporate server to a user selected location on disk as well. This Tool may be used to obtain a static or “standalone” ArcView project that can be archived to disk or CD-ROM. One might use this to archive the data used to make an important planning or construction decision. This may be necessary as the data on the corporate servers are continuously updated as new information becomes available. Thus the same analysis done one year from now may not reach in the same conclusion.

Theme Metadata:

Displays the metadata for a theme selected by the user. A message box prompts the user to select a theme of interest. The tool links to the a html document using Microsoft's Internet Explorer to display the Metadata document. If you don't have an Internet browser, this tool will not work.

Metadata is data about the selected Theme. Some examples of information you will find in the Metadata document are the accuracy and origination source of the data.

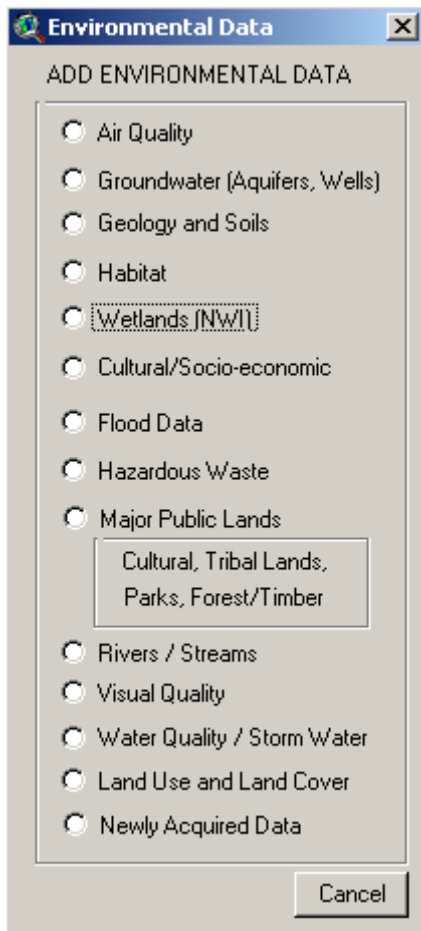
Add Theme:

Displays a list of all data currently available through the Workbench. A message box prompts the user to select a theme of interest. If possible, the data source is added as a new Theme within the currently active view.

Delete Themes:

A message box will appear with a list of themes in the active view. The user is prompted to select the theme they wish to delete. The theme will be deleted from the view. Only one theme can be deleted at a time.

3. ENVIRONMENTAL DATA:



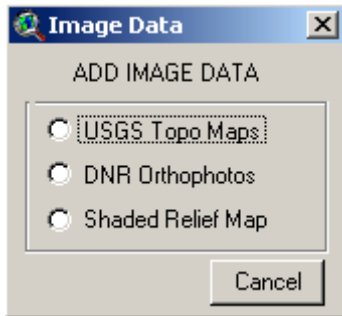
Several categories of environmental data are available for use. The categories tend to follow the Environmental Portion of the Project Review form. Once a category is selected, a dialog box will list all the GIS layers available for that topic. Select the layers you are interested and select the “Apply” button. The layers will be added to your view.

Note that the environmental data maintained by the department is continually updated and expanded. To make this new data more accessible, a “Newly Acquired Data” radio button has been added to the environmental dialog. When this option is selected the user is presented with a list of data sets that have been added to agency database since the Workbench was deployed.


If your view starts getting full, you can always go back to **Add a Base Map** option under SETUP and start a new view with the original base map layers.

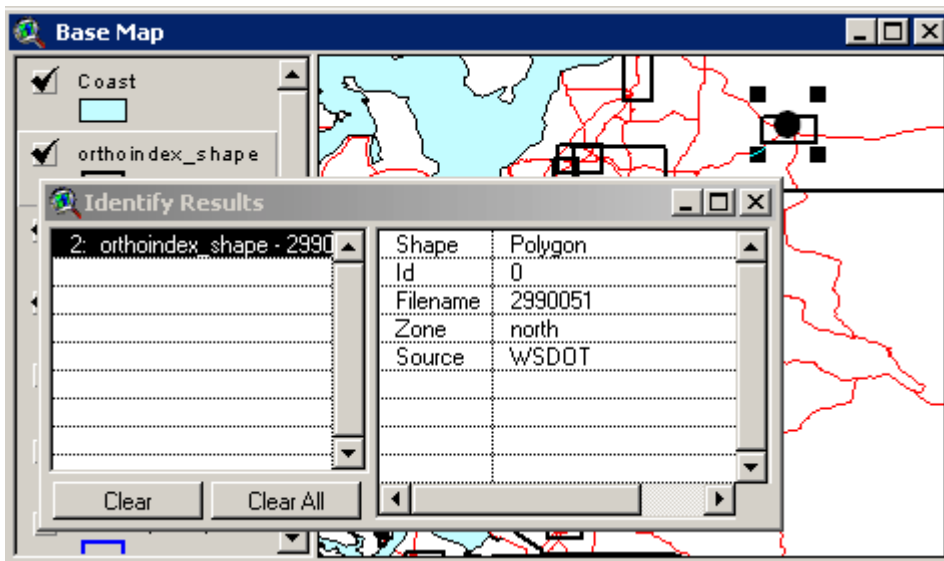
Use the “Theme Metadata” Tool to help answer questions about the data being displayed.

4. IMAGE DATA



Several sets of imagery are available for use as a backdrop within a Base Map view. Selecting “USGS Topo Maps” will provide the user with the ability to add digital raster graphics (DRG) of USGS topographic maps to their view. Note, that users may only have DRGs available for their region. Selecting “DNR Orthophotos” provides the user the ability to add black/white orthophotography to their view. Note, the DNR orthophotos are added by County and the dates of photography vary from 1995 to 2000. Selecting “Shaded Relief Map” will add a relief map to the current view. This backdrop image is the smallest and fastest drawing of the three, and may be used for statewide mapping.

Additional orthophotography is available on the WSDOT Corporate Server. It may be accessed from within the Workbench by using the “Add Theme” Tool. To load the WSDOT orthophotography, find the *Orthophotos, Washington State Department of Transportation Photogrammetry* in the list and click on “Add Theme”. From the popup list select and add the orthophoto index shape file (i.e., *orthoindex_shape*) to the current view. Make the index active, and then use the identify tool  on the ArcView interface to determine the name of the image files that cover your area of interest.



Once you know the filename, in this case opis_2990051_image you can find it in the list returned by the “Add Theme” Tool.

ArcView Basics

How can I add other GIS Layers?

To add additional themes to a view, make the view active and use the Add Theme button.



A list of available feature data displays in the add Theme file browser. Use the browser to navigate to the directory containing the data layer. These layers are located on the W drive in the W:\DATA\GIS subdirectory (This assumes your GIS Server is mapped to the W drive.)

What data is available and where is it located?

There are two areas to search for data:


1. A spreadsheet called datalist.xls is available on the GIS server in the gisosc\geodata directory. This contains a list of GIS data and the directory structures.

2. The GIS Data Catalog on the Internet:

<http://www.wsdot.wa.gov/gis/geodatacatalog>

(To find the pathname for the data look in *Distribution Information* under *Resource Description*)

How do I display the attribute values of features in the view?

Use the Identify tool: 

Before using the Identify on a view, click on the theme in the Table of Contents that contains the feature you wish to identify to make the theme active.

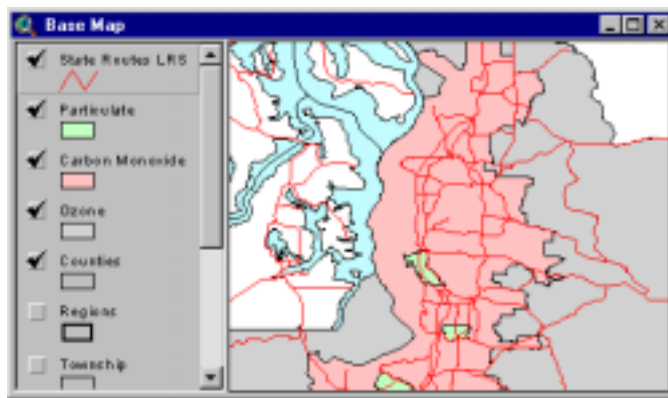
Choose the Identify tool and then click on the feature in the view.

The identify tool displays its results in a dialog box. The dialog box has two panels, the left side contains a list of all the features you have identified so far. The right side of the dialog box displays the results of each identify.



My theme is covering other features. How can I fix the display?

The order in which themes are drawn on a view is based on the order they appear in the Table of Contents. The theme at the top of the Table of Contents is drawn on top of those below it, and so on down the list.



To change the order a theme is drawn in, drag the theme up or down the Table of contents. When you drop the theme in its new position, the view will automatically redraw in the new order.

When you add a theme to a view it is automatically placed at the top of the Table of Contents.

How do I change the color of my theme?

Double click the theme name in the Table of contents. The Legend editor will appear. Double click on the symbol to bring up the Palette Manager. Maneuver through the Palette manager to change symbols and colors of your theme.




How do I select features?

The select features tool allows you to select features in the view



Before you use this tool, make the theme from which you wish to select features active, by clicking on its name in the view's Table of Contents. You select features by clicking on them individually or defining a box around them. Hold down SHIFT when you click on features to select more than one. Features that you select are highlighted on the view. The selected features will be drawn in yellow. To open the attribute table of the currently active Theme, click on the 'Open Theme Table' button. The rows in the attribute table have a one to one relationship with the features in the currently active theme. The yellow rows correspond for the selected features in the View.

How do I select and delete graphics?

Use the Pointer tool to select a graphic 

Once the graphic is selected, hit the delete key on the keyboard to delete it.

